

**AMPEX**

1809040-01

# VR-3000 Capacitive Tape Compliance Assembly Kit

Operation and Maintenance Manual

ISSUED: NOVEMBER 1970

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## SERVICE INFORMATION AND PARTS

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1. System name
2. Model number (including revision number)
3. System number
4. Serial number
5. Power requirements
6. System modifications and special accessories
7. Date of purchase
8. Name and address of your organization
9. Job function to which communication should be addressed
10. Physical location of equipment

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## INSTRUCTION MANUAL CHANGES

Another part of the Ampex program of technical support for its products is the continuous revision and modification of instruction manuals as the equipment is improved or modified. In order to ensure that you always receive this information, write to:

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Audio/Video Technical Publications  
401 Broadway  
Redwood City, California 94063 USA

### NOTE

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1. System name
2. Model number (including revision number)
3. Serial number
4. Power requirements
5. System modifications and special accessories
6. Approximate date of purchase
7. Name and address of your organization
8. Job function to which communication should be addressed

# SAFETY & FIRST AID

Because personnel working with electronic equipment are exposed to the hazard of high voltage, it is imperative that all safety regulations be consistently observed, and that each individual has a clear understanding of basic First Aid methods.

The following typical hazards must be avoided at all times:

- 1** Do not attempt adjustment of unprotected circuit controls, or lead dress while the power is ON.
- 2** Do not change heavily loaded or overheated components without due precaution to avoid burns.
- 3** Do not assume that no dangerous voltage is present when the power is OFF. Charged capacitors may retain dangerous voltages for long periods, and should be discharged through a suitable resistor before any circuit points are touched.
- 4** At all times avoid placing any parts of the body in series between ground and circuit points, whether or not power is ON.
- 5** Do not assume that solid-state circuits and semiconductor cases carry only low voltages.

V 0 8 6 3 3

For their own protection, and the protection of others, all electronic personnel should become thoroughly familiar with the approved First Aid treatment of burns and shock. There are three principal degrees of burns, recognizable as follows:

1. A first degree burn reddens the skin
2. A second degree burn blisters the skin
3. A third degree burn chars the flesh and frequently places the victim in a state of shock accompanied by respiratory paralysis.

Respiratory paralysis in the victim can cause death within seconds, by suffocation. For this reason it is imperative that the approved method of artificial respiration be initiated immediately and continued until the victim's breathing is normal.

A muscular spasm or unconsciousness may render the victim unable to free himself of the electric power. If this is the case, turn the power OFF immediately.

## CAUTION

DO NOT TOUCH HIM, OR YOU MAY SHARE HIS PREDICAMENT.

If the power cannot be turned OFF immediately, **very** carefully loop a dry rope, article of clothing, length of strong cloth, or a rolled-up newspaper around the victim and pull him free of the power. Carefully avoid touching him or his clothing.

The moment he is clear of the power, place him in a reclining position, cover him with a blanket (or newspapers) to keep him warm, and begin artificial respiration. At the first opportunity, enlist help in the summoning of a doctor. If a doctor cannot be summoned, transport the victim to the doctor, infirmary, or hospital. Be sure that the victim is kept well covered and warm while awaiting professional aid and treatment.

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## SECTION I

### EQUIPMENT IDENTIFICATION

#### 1-1 GENERAL DESCRIPTION

1-2 This publication provides information for installing capacitive type tape tension compliance arms on VR-3000 portable video recorders, Catalog No. 1805278, in place of the existing strain gauge type. Also included is other information such as theory of operation, maintenance, and parts list data.

1-3 Table 2-1 in Section II lists the items included in the kit. Installation instructions are also contained in Section II.

#### 1-4 DETAILED DESCRIPTION

1-5 The kit includes two new tape compliance assemblies and covers which are installed on the recorder top plate in place of the existing items. To complete the installation, a minor modification is made to the circuit of the torque motor driver boards (see Figure 2-4), and the tape tension system is readjusted to the original specification.

1-6 When the new compliance system is installed and adjusted as outlined in this manual, the tape tension during record and playback functions is considerably more stable. In addition to this, the new arms permit the use of a wide range of tape types without need for tension readjustment. Functional operation of the overall tape tension system remains unchanged.



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## SECTION II

### INSTALLATION

#### 2-1 UNPACKING

2-2 Carefully unpack the kit, handling the delicate items with the appropriate amount of care. Discard surplus packing material (be sure not to accidentally discard any small packages or special instruction sheets, etc.) and check the kit items against the kit list, Table 2-1, to be sure the kit is complete. Visually check the kit items for possible damage and, if all items are satisfactory, proceed with installation.

#### 2-3 EQUIPMENT PREPARATION

2-4 Take equipment out of service and remove any loose items of a type associated with equipment operation. Dust off the equipment cabinet and clean the head assembly of loose oxide.

2-5 Disconnect ac power and, if possible, move equipment into a work area in which proper lighting, working space, and bench space is available.

#### 2-6 INSTALLATION PROCEDURE

##### 2-7 General

2-8 This manual contains all installation instructions needed to install this kit. No special tools are required other than those normally found in a technician's tool kit. Avoid unnecessary damage by using tools only of the correct type and size.

2-9 For soldering operations, use a 25 to 40-watt iron fitted with a fine or medium-sized tip. Use 60/40 (or 63/37) resin-cored solder; remove any excess solder with a solder suction device (rather than shaking molten solder into places where it can cause problems).

2-10 An electronic voltmeter (to read 0-3 volts) and a calibrated oscilloscope are needed to set up the tape tensions.

*Table 2-1. Kit List\**

ITEM	QTY	DESCRIPTION	PART NO. (OR MFR.)
1	1	Tape Compliance Assembly, Supply Side	1367360
2	1	Tape Compliance Assembly, Take-Up Side	1367361
3	1	Cover, Compliance Assembly, Supply Side	1361680
4	1	Cover, Compliance Assembly, Take-Up Side	1361681
5	1	Resistor, Composition, 47K ohm, 1/4W, 5%	Allen Bradley
6	1	Resistor, Composition, 27K ohm, 1/4W, 5%	Allen Bradley
7	2	Potentiometer, 50K ohm, 1W, 5%	Bourns 3290W-1-503

*\*For complete parts list information, see Section VI.*

## 2-11 Installing Compliance Assemblies

2-12 To install the compliance arms, proceed as follows. It is recommended that the steps be accomplished in the order written.

- a. Check that all power (battery and ac) is disconnected from the recorder.
- b. Unfasten three Allen head screws, remove the video head assembly, and store safely.
- c. Unfasten the screws and remove the four covers from the existing compliance arm assemblies, and also remove the audio head driver board (see Figure 2-1).
- d. Note the color coding of the wires connected to each existing compliance assembly printed circuit board, and record this information in the spaces provided in Table 2-2 of this manual.
- e. Unsolder the wires carefully, avoiding unnecessary heat damage to the insulation, especially in the case of the shield.

- f. Unfasten the mounting screws and remove and discard the existing compliance arm assemblies and also their associated covers.

### NOTE

Retain the existing hardware for use when installing the new compliance assemblies and covers.

- g. Take the two new compliance assemblies (items 1 and 2) from the kit. Unfasten the screws which secure each printed circuit board to the post, and remove the circuit boards. Be sure to save the solder lug supplied with the take-up board. Also, take note of the position of both circuit boards. This is so the boards can be re-installed correctly.

- h. Using the existing hardware saved from the disassembly, mount the two posts to the recorder top plate. Before tightening the screws in the supply post, hand apply clockwise rotational torque; then tighten the screws.

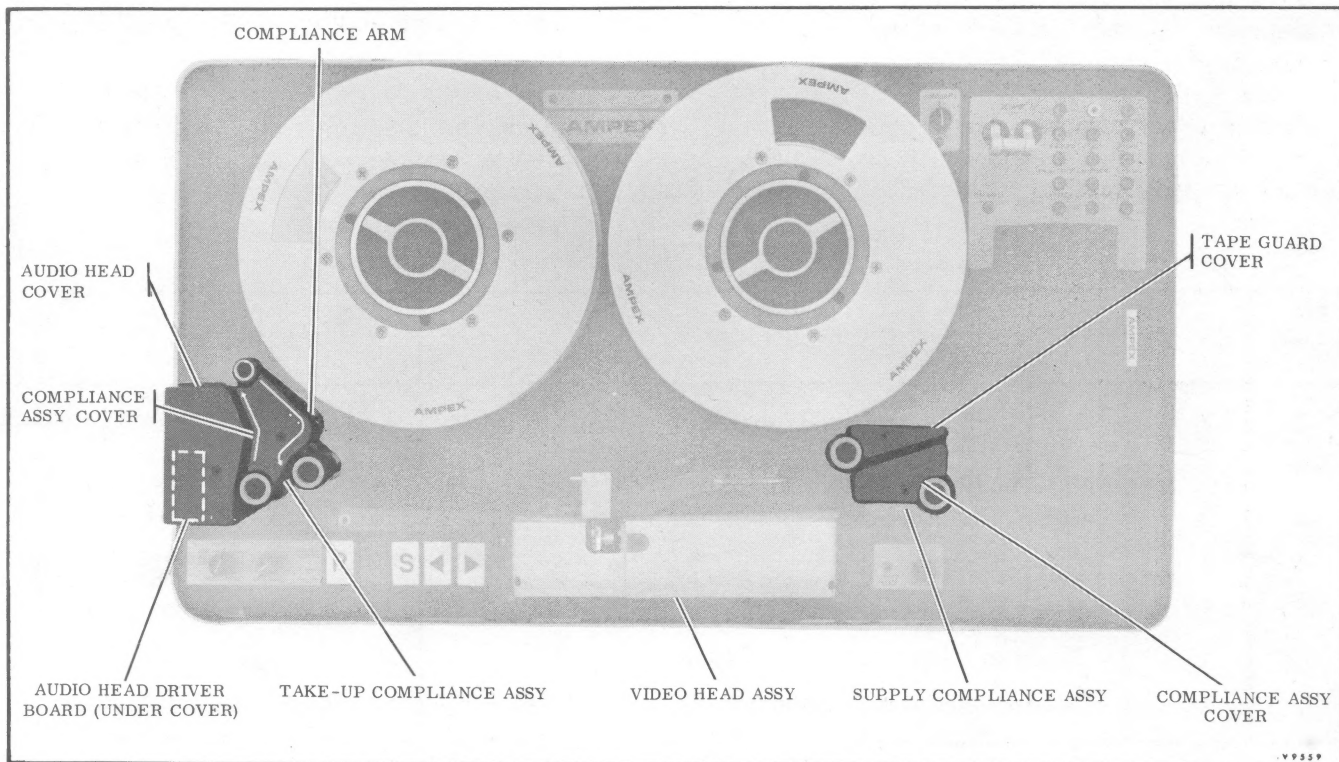


Figure 2-1. Location of Compliance Arm Assembly

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Table 2-2. Compliance Assembly Wiring Connections

STRAIN GAUGE SYSTEM			CAPACITANCE SYSTEM	
PIN CONNECTION	OLD FUNCTION	WIRE COLOR	NEW FUNCTION	NEW PIN CONNECTION
Take-up E3	Play +12V	Orange-white	Play +12V	Take-up E3
Take-up E4	Sense	Yellow-blue	Reference	Take-up E1
Take-up E5	Reference	Yellow-green	Sense	Take-up E2
Take-up E6	Ground	Shield	Ground	Take-up (E4) Ground Lug
Supply E3	Play +12V	Orange-white	Play +12V	Supply E3
Supply E4	Sense	Yellow-blue	Reference	Supply E1
Supply E5	Reference	Yellow-green	Sense	Supply E2
Supply E6	Ground	Shield	Ground	Supply E4

NOTE: The functions of sense and reference are reversed in the new capacitive system.

i. Reinstall each circuit board on its associated compliance arm post. Be sure that both screws in each board are fitted with lock washers and are properly tightened to ensure good grounding. Also be sure the solder lug on the take-up board shield is connected under the lower screw.

j. Clean up the wire ends, and solder each wire to the appropriate pin listed in Table 2-2 and illustrated in Figure 2-2. Solder the shield to pin E4 first, then solder the wires to E3, E2 and E1 in that order. Do not shorten the wires (especially on the take-up side), as excess cable in the harness is limited.

k. Reinstall the audio head driver board.

l. This completes the compliance arm installation. Do not replace the covers at this time.

## 2-13 MODIFICATION OF TORQUE MOTOR DRIVER BOARDS

2-14 Unfasten nine Allen head screws and remove the recorder from its carrying case. Install the bench support posts (supplied in the VR-3000 miscellaneous and maintenance parts kit), then

turn the recorder over and lay on a flat surface so access can be gained to the two torque motor driver boards (see Figure 2-3). Accomplish the modification as follows:

a. Unfasten hold-down screws and remove both torque motor driver boards.

### NOTE

On early model recorders (1805278-01), the driver boards are inside the motor assembly. To gain access, unfasten four screws and remove the motor end plate.

b. Refer to Figure 2-4 (or Figure 2-5 for early model recorders), which is a partial schematic of the two driver boards. Using components from the kit, change the fixed resistor and potentiometer on both boards as shown. For convenience, preset to the indicated values before installation. Complete schematics, showing the modifications incorporated, can be found in Section V of this manual.

c. Identify the board as having been modified.

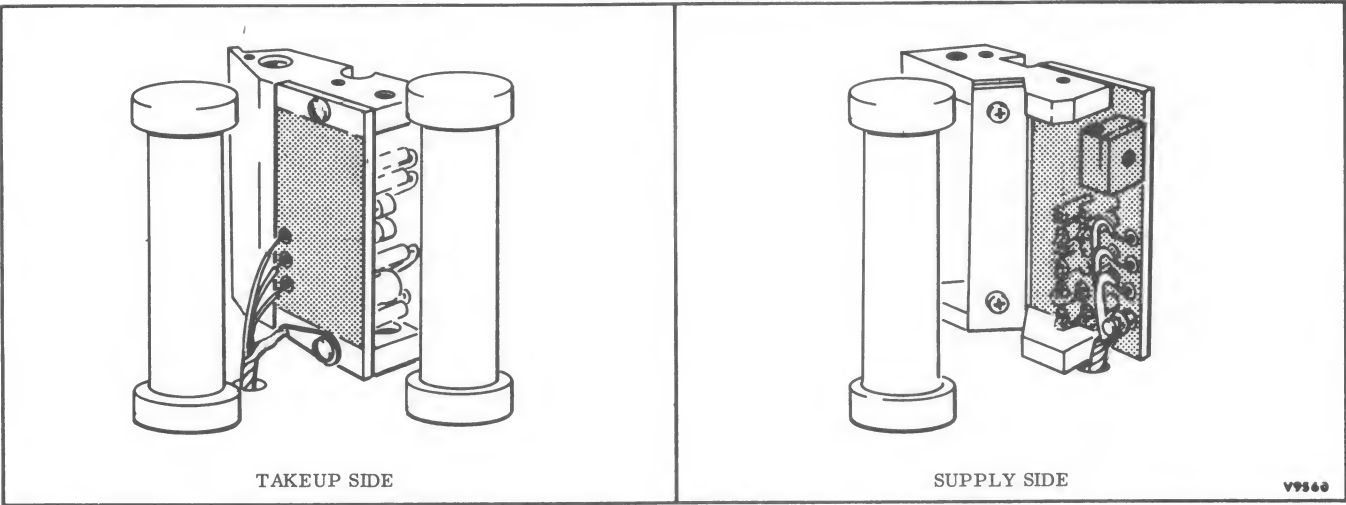


Figure 2-2. Connection of Wires to Compliance Arm Circuit Boards

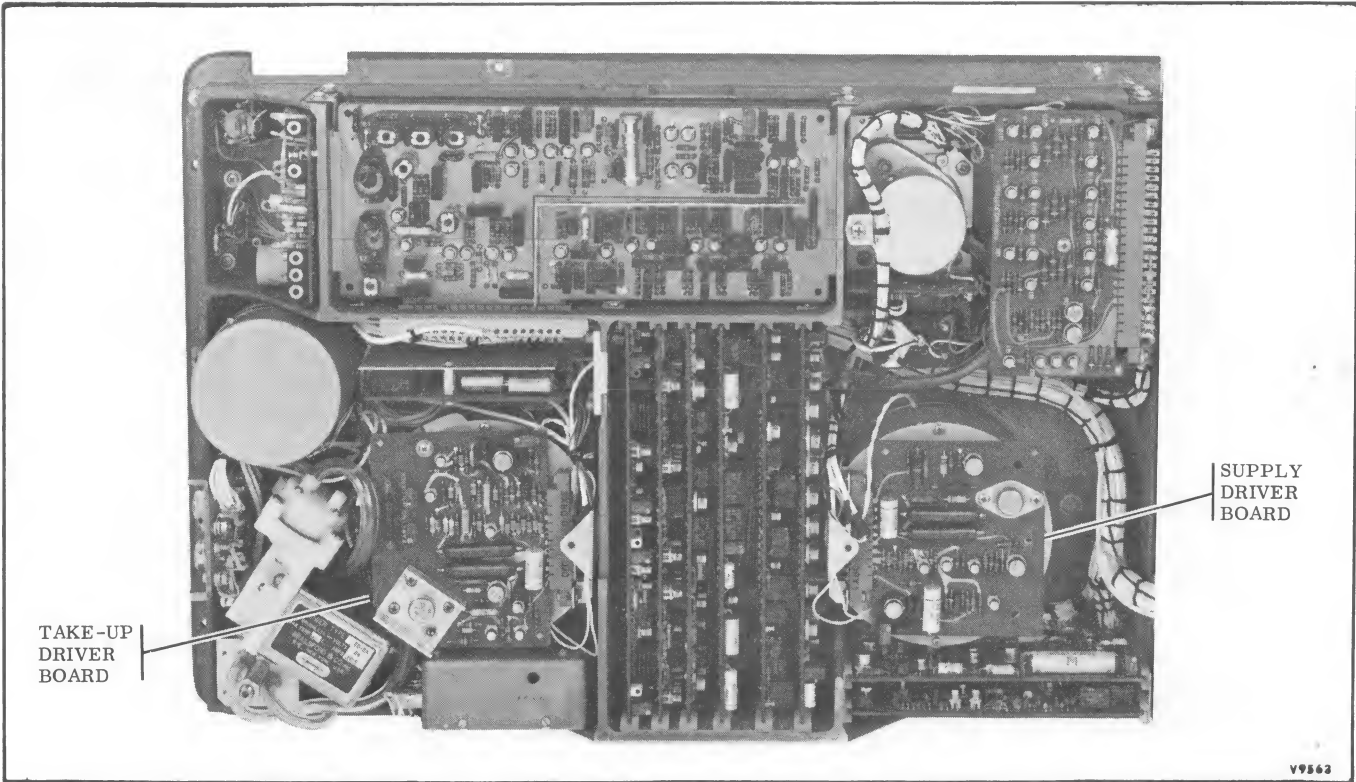


Figure 2-3. Location of Driver Boards

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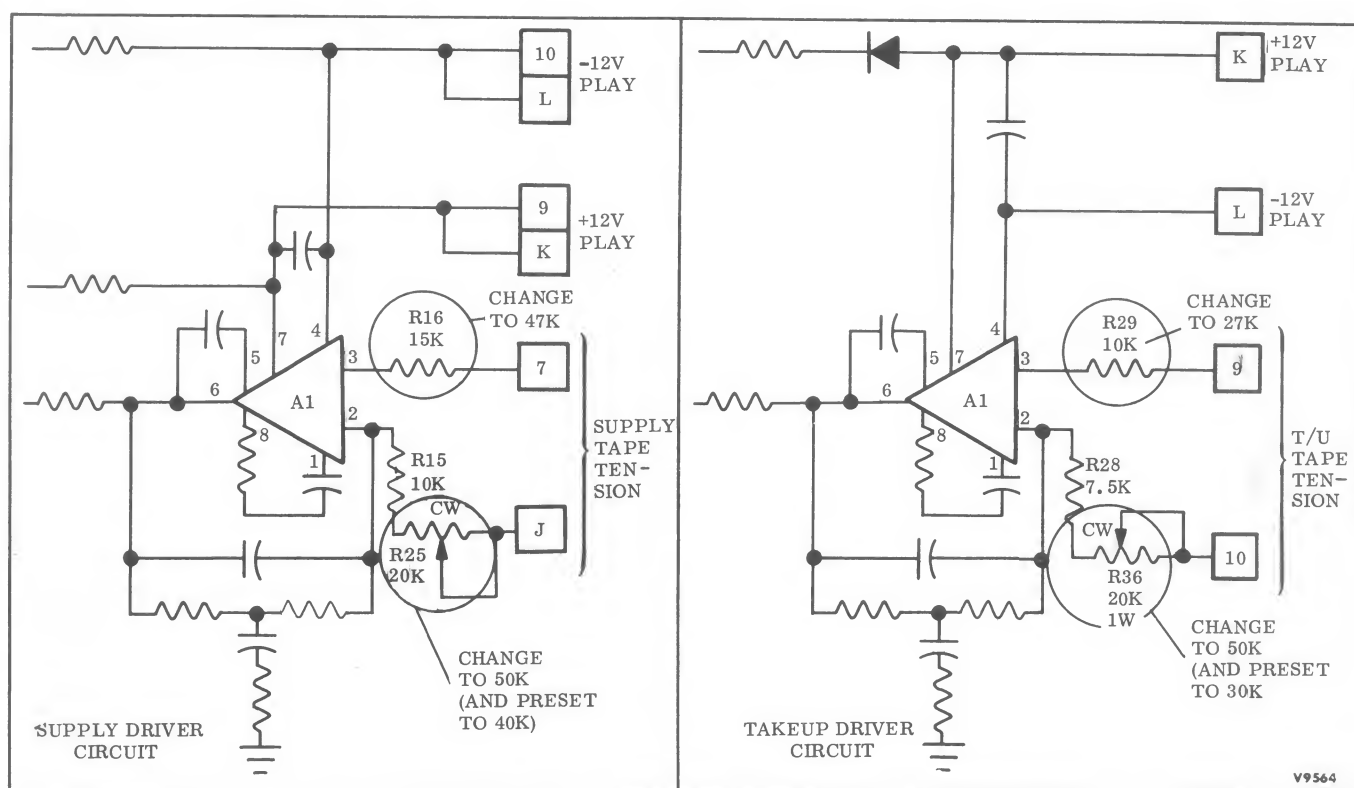


Figure 2-4. Changes to Torque Motor (Late Models)

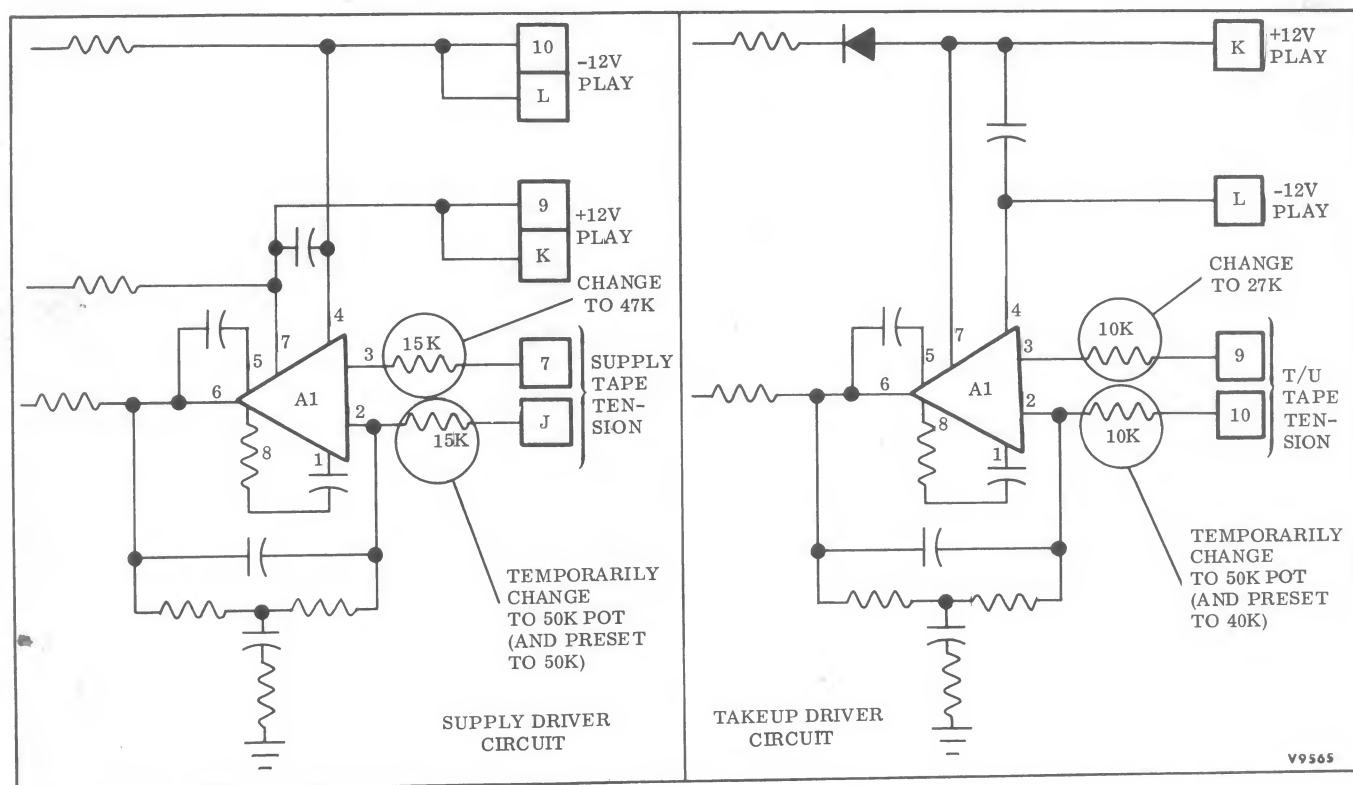


Figure 2-5. Changes to Torque Motor Driver Boards (Early Models)

d. Recheck the wiring and soldering of step *b*, being sure that the potentiometers are pre-set as called for on the illustration.

## 2-15 PRELIMINARY CHECK FOR COMPLIANCE OPERATION

2-16 Temporarily reinstall both driver boards, then carefully turn the recorder over, reinstall the video head, and perform the following preliminary checks and adjustments.

a. Connect power, set POWER switch to ON and press the PLAY pushbutton (without tape).

b. At the supply compliance assembly, connect an electronic voltmeter to pin E1 on the printed circuit board and adjust tension setting potentiometer R1 for +1.5 volts.

c. Connect the electronic voltmeter to pin E2, deflect the tension arm by hand, checking

that the sense voltage at E2 varies from approximately +1.7 volts down to +0.7 volts in the fully depressed position.

d. Perform the same at the take-up compliance assembly, except that now the voltage should be adjusted to +0.1 volt, and should vary (at E2) between +1.2 volts and +0.6 volts (approximately) when the tension arm is deflected.

2-17 The preceding preliminary check and adjustment procedure proves that the newly installed compliance assemblies are operating correctly. Should one, or both, arms fail to perform as specified in steps *c* and *d*, recheck the wiring and soldering operation, and also check that both screws securing the circuit boards to the compliance assembly parts are tight and are properly grounding the circuit board ground bus. When the new compliance arms are operating correctly, proceed with the adjustment procedures in Section IV, Maintenance, in this manual.

## SECTION III

## THEORY OF OPERATION

## 3-1 GENERAL

3-2 The capacitance type of compliance system installed by this kit uses the variable impedance of a capacitive tape compliance arm to produce a dc sense output (to the reel driver boards) which is related to tape tension.

3-3 All the circuitry to accomplish this is contained on the small printed circuit board in each compliance assembly, and is shown on Figures 3-1, 5-2 and 5-3 in this manual.

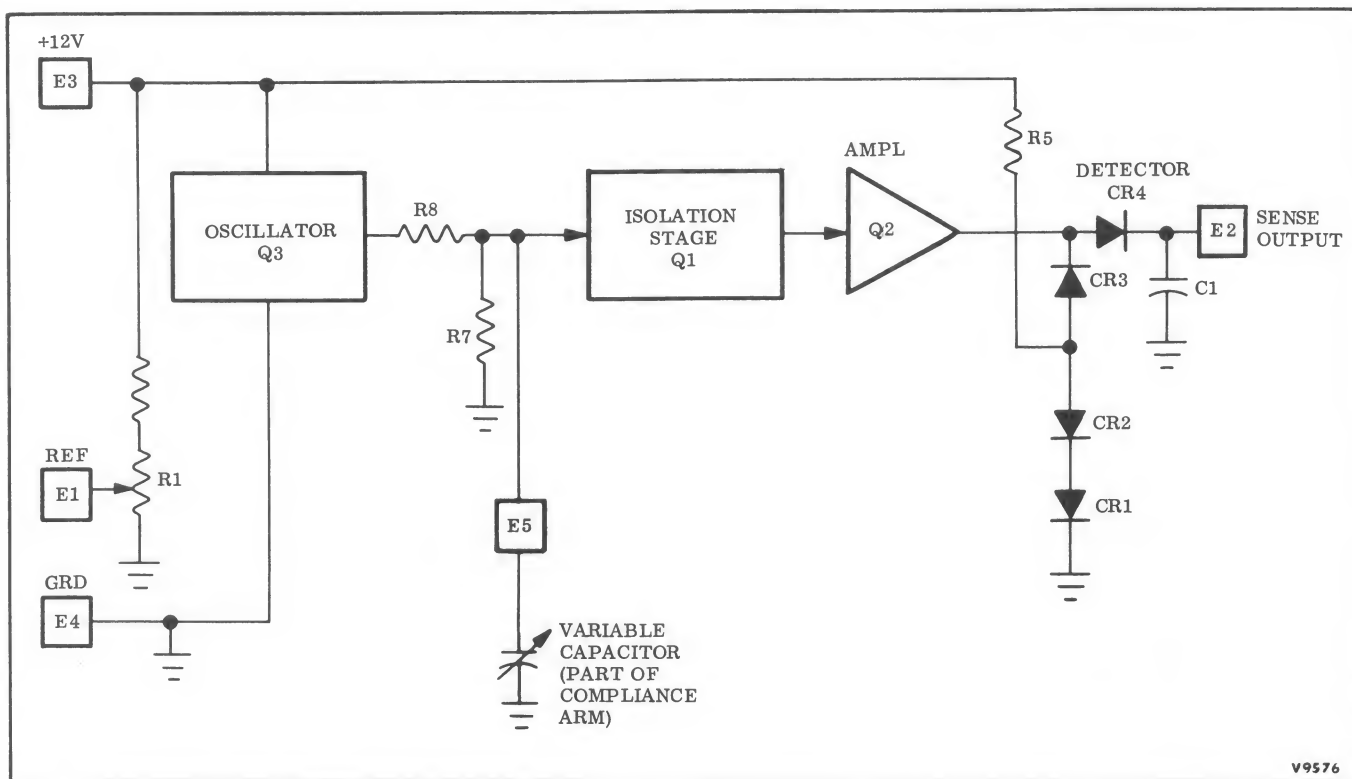
## 3-4 DETAILED DESCRIPTION

3-5 The circuit consists of a 500-kHz (approximately) oscillator Q3, an isolating stage Q1, and an amplifier stage Q2. The oscillator produces a fixed frequency at a stable output level which is coupled to voltage divider R7 and R8. The signal from the voltage divider tap is isolated by Q1, amplified by Q2, and detected by voltage doubler CR3 and CR4. The resulting dc sense output is then routed to the

appropriate driver board in the record control circuitry.

3-6 Also connected to the voltage divider is the capacitive compliance arm. This device is deflected by the tape so that its capacity or impedance varies with tape tension. The varying impedance of the capacitive arm bypasses some of the oscillator output to ground, thus the signal through Q1 and Q2 varies, and this causes the dc signal at the sense output to change. The circuit is arranged so that as tape tension increases, the dc sense output level decreases. This, in conjunction with the existing driver board circuitry, maintains the proper supply and take-up tensions as described in Section VI of the manual furnished with the recorder.

3-7 Potentiometer R1 sets the reference level for the operational amplifier on the associated driver board in the recorder. Tape tension is thus set by R1. Forward-biased diodes CR1 and CR2 provide temperature compensation for the voltage doubler rectifier diodes. Capacitor C1 filters out oscillator frequency ripple.





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**SECTION IV**  
**MAINTENANCE****4-1 INTRODUCTION**

4-2 This section contains the procedure necessary to set up tape tensions. The procedure should be used in its entirety when the capacitive system is first installed or when board components in the tape tension circuitry have been changed. For periodic tension adjustments, the steps pertaining to the supply and take-up driver boards may be omitted.

**4-3 BASIC TENSION ADJUSTMENT PROCEDURE****4-4 General**

4-5 This procedure supercedes the tape tension adjustment instructions found in Section IX of the manual furnished with the recorder. This new procedure is somewhat similar to the old and is intended to adjust the supply and take-up servos so they maintain eight ounces of tape tension on each side of the head assembly under all conditions of tape distribution between the reels.

4-6 To make this adjustment, two indicators of tape tension are used, one for the supply side, and one for the take-up side. One indicator is mechanical by nature and consists of an eight-ounce reference mark on a piece of tape applied to the top plate under the supply compliance assembly. The other indicator is electrical and consists of reading the motor voltage of the capstan servo with an electronic voltmeter. Adjustments are then made to obtain a minimum of tension differential across the capstan and head assembly at all conditions of tape distribution between the reels. While some tension differentials may exist, excessive amounts will cause capstan slippage and thereby produce non-standard or unusable recordings.

**4-7 Setting the Mechanical Indicator**

4-8 To accomplish this, proceed as follows:

**NOTE**

Use only 8-inch diameter precision type metal reels when making tape tension adjustments. Ampex Part No. 28050 is recommended. Lighter reels cause increased tension servo loop gains which may cause oscillations.

a. Install the video head, load a reel of tape on the supply reel, thread the tape in the path shown in Figure 4-1, then apply the mechanical reel brake.

b. Attach a spring balance scale (0—2 pounds) to the end of the tape.

c. Affix a piece of masking tape to the top plate under the supply compliance assembly arm as shown on Figure 4-1.

d. Pull on the scale to produce eight ounces of tape tension, then mark the masking tape with a pencil at the place where the compliance arm roller rests (see Figure 4-1).

e. Release the tape tension, disconnect the scale, and release the mechanical brake.

**4-9 Setting the Electrical Indicator**

4-10 To accomplish this, proceed as follows:

a. Turn on ac power.

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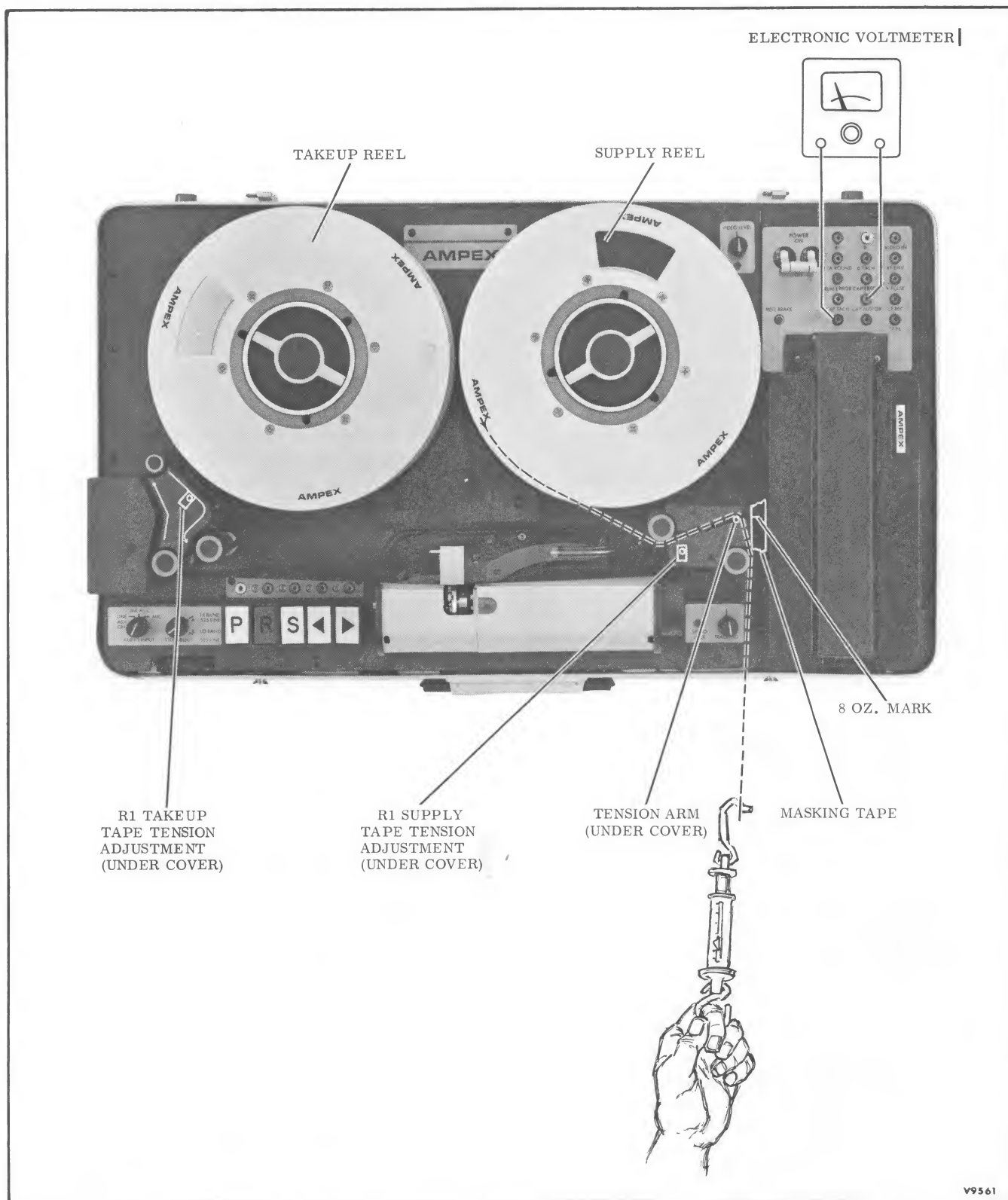


Figure 4-1. Tape Tension Indication and Adjustment Points

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b. Connect a standard test signal to the recorder video input jack J7 (see Section III, Familiarization, in the VR-3000 manual). DO NOT THREAD TAPE AT THIS TIME.

c. Connect an electronic voltmeter between CAP MOTOR (TP16) and GRD (TP18) on the recorder test panel.

d. Press RECORD READY and PLAY pushbuttons to initiate the record mode.

e. Make a note of the negative-going capstan motor voltage on the voltmeter; it will be approximately -4 volts. *3.2, 3.4*

f. Stop the recorder, but leave the voltmeter connected.

#### 4-11 Preliminary Tension Adjustments

4-12 These adjustments set the tension first on the supply side for 8 ounces, and then on the take-up side so that the capstan is required to contribute only the minimum of power used to move the tape during play and record modes.

4-13 To adjust, proceed as follows:

a. Load a full reel of degaussed tape on the supply turntable as shown in Figure 4-1.

b. While holding the tape by hand (scale is not needed) initiate play mode.

c. While manually pulling tape from the supply reel (against the hold-back torque), adjust potentiometer R1 on the compliance arm assembly so the hold-back tension of the supply reel deflects the arm to the same position as marked by the pencil line on the tape. The hold-back tension is now correctly set to eight ounces.

d. Stop the recorder, thread the tape for normal operation, then initiate record mode.

e. While tape is running, adjust potentiometer R1 on the take-up compliance assembly to obtain the same voltmeter reading as in step e of paragraph 4-10.

#### NOTE

Turning R1 clockwise increases tape tension by increasing take-up motor torque. As take-up tension increases, capstan motor voltage decreases.

f. If the step e adjustment does not provide sufficient torque to initiate tape movement, increase torque by making an adjustment to the new potentiometer (R36) on the take-up motor driver board. Turn the adjustment clockwise (decreased resistance) to increase servo loop gain, which will result in an increase in torque. Do not over-adjust clockwise; this causes oscillation of the servo loop (see following steps).

4-14 TENSION SERVO LOOP GAIN ADJUSTMENT—TAKE-UP SIDE. To adjust the take-up tension servo loop gain, proceed as follows:

a. Stop the recorder, degauss and re-thread the tape.

b. Connect an oscilloscope to the output (pin 6) of operational amplifier A1 on the take-up driver board, trigger from the power line and set the controls for 0.05 v/cm and 0.2 sec/cm.

c. Initiate record mode and observe the oscilloscope display which will show essentially a straight line.

d. On the take-up driver board, turn the new potentiometer (R36) clockwise (decreased resistance) until the servo loop is observed to just break into oscillation.

e. At the same time R36 is being turned, the voltage on the electronic voltmeter connected to the CAP MOTOR test point should be maintained per step e of paragraph 4-10 by readjusting potentiometer R1 on the take-up compliance assembly.

f. Stop the recorder, disconnect ac power, then remove the take-up driver board.

g. Measure the *combined* resistance of the new potentiometer R36 and its associated fixed resistor R28 (see Figure 2-4), then set the

potentiometer to obtain a *combined* value which is twice that measured. In the case of early models, replace the new temporary potentiometer with a fixed resistor, twice the value of that measured by the potentiometer.

#### NOTE

The preceding steps must be accomplished at the beginning of the reel of tape. If too much tape is consumed, thus causing doubt as to the validity of the adjustment, rewind and degauss the tape, then repeat steps *a* through *g*.

h. When the adjustment is complete, permanently reinstall the driver board, reconnect ac power, then rewind and degauss the tape.

i. Install tape, initiate record mode and adjust potentiometer R1 on the take-up compliance assembly for the value noted in step *e* of paragraph 4-10.

j. This completes the tension servo loop gain adjustment on the take-up side. Rewind and degauss the tape, then accomplish the supply tension adjustment which follows. Leave the voltmeter connected.

**4-15 TENSION SERVO LOOP GAIN ADJUSTMENT—SUPPLY SIDE.** To adjust the supply tension servo loop gain, proceed as follows:

a. Load a full reel of degaussed tape on the take-up turntable.

b. Thread tape and rewind several minutes of tape onto the supply turntable.

c. Connect the oscilloscope to the output (pin 6) of operational amplifier A1 on the supply driver board.

d. Change the scope vertical sensitivity to 0.5 v/cm (leave horizontal at 0.2 sec/cm).

e. Initiate record, observe the scope display, then turn the new potentiometer (R25) on the supply driver board clockwise until the servo loop is seen to just break into oscillation.

f. At the same time R25 is being turned, R1 on the supply compliance assembly should be adjusted to maintain the eight ounce reference deflection of the supply compliance arm.

g. Stop the recorder, disconnect ac power, then remove the supply driver board.

h. Measure the combined resistance of new potentiometer R25 and its associated fixed resistor R15 (see Figure 2-4), then set the potentiometer to obtain a combined value which is twice that measured. In the case of early models, replace the new temporary potentiometer with a fixed resistor which is twice the value of that measured by the potentiometer.

#### NOTE

The preceding steps must be accomplished as near as possible to the end of a full reel of tape. If the tape runs out, thus causing doubt as to the validity of the adjustment, rewind and degauss the tape, then repeat steps *a* through *h*.

i. When the adjustment is complete, install tape on take-up turntable, thread as in step *a*, and then rewind several minutes of tape.

j. Initiate record mode and adjust potentiometer R1 on the supply compliance assembly to obtain the eight ounce reference deflection of the supply compliance arm.

k. This completes the tension servo loop gain adjustment on the supply side. Rewind and degauss the tape, then proceed to the final tension adjustment which follows. Leave the voltmeter connected.

#### 4-16 FINAL TENSION ADJUSTMENT PROCEDURE

**4-17** The foregoing procedure sets the take-up and supply tensions under condition of maximum servo loop gains. However, it is necessary to check and possibly readjust the tensions while recording where the loop gains are minimum. To do this, proceed as follows:

a. Load a full eight-inch reel of degaussed tape on the supply reel turntable. Thread tape.

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b. Initiate record mode and adjust (if necessary) potentiometer R1 on the supply compliance assembly for the reference eight-ounce deflection of the arm.

c. Stop the recorder, rewind and degauss the tape, then load the tape on the take-up reel turntable.

d. Thread tape and rewind a few minutes of recording time, then initiate record mode.

e. Adjust (if necessary) potentiometer R1 on the take-up compliance arm for no-load capstan motor voltage taken in step *e* of paragraph 4-10.

f. Repeat steps *b* through *e* of this paragraph to cancel any interaction effects between the two adjustments.

g. Stop the recorder, degauss the tape, then load the tape on the supply reel turntable.

h. Initiate record mode, and monitor the capstan motor voltage from one end of the reel to the other. When the tension servo system is correctly adjusted, the voltage will deviate from the

no-load reference level of step *e* in paragraph 4-10 no more than  $\pm 1$  volt dc.

i. If difficulty is experienced, a compromise can be made in the final adjustment method. This consists of alternately adjusting the eight-ounce supply arm deflection, and the take-up tension for the reference no-load capstan motor voltage. Adjust these until interaction is cancelled, or at the minimum. Make these adjustments in the middle of a full reel of tape.

j. This completes tape tension adjustments. Rewind and remove the tape, disconnect the test equipment and check that the driver circuit boards are reinstalled properly.

k. Remove the bench supports and re-install the recorder in its portable carrying case.

#### **4-18 COMPATIBILITY CHECK**

4-19 Before placing the equipment into service, it is best to make a compatibility check to verify that tapes made on the VR-3000 recorder are standard in format. Do this by making a recording at the start, middle and end of a reel of tape, then playing them back on a conventional studio recorder.



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**AMPEX**

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## SECTION V

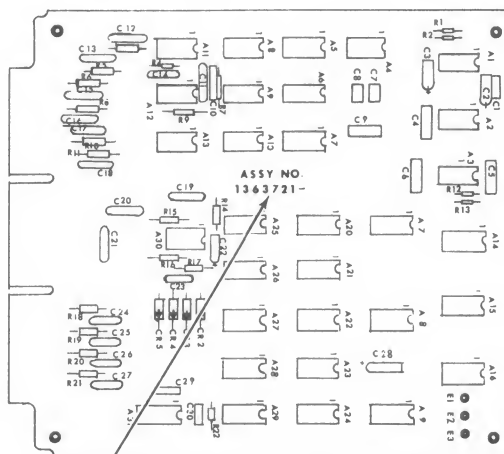
### SCHEMATIC DIAGRAMS

This section contains all the necessary schematic diagrams. When applicable, a note on the schematic will reference it to the appropriate assembly drawing. The schematic pertinent to any assembly is listed on the LM of that assembly (see the follow-

ing section). The section has a two-part index, one listing the drawings in alphabetical order and one listing them in numerical order. Alphabetical listings are generally in direct reading order; e.g., "High Gain Amplifier", not "Amplifier, High Gain."

## ALPHABETICAL INDEX TO SCHEMATICS

Title	Assembly No.	Schematic No.	Fig. No.	Page
Auto Search Logic	1363748	1363750	16	8-35
Buffer Store	1363760	1363762	4	8-11
Buffer Store and Buffered Functions Mother Board	1363727	1363729	3	8-9
Buffered Functions Board No. 1	1363763	1363765	5	8-13
Buffered Functions Board No. 2	1363763	1363766	6	8-15
Chroma Inverter	1363757	1363759	19	8-43
Control Unit Logic	1363754	1366183	17	8-39
Decade <=> Comparator	1363767	1363769	10	8-23
Decade <=> Comparator Mother Board	1363742	1363744	9	8-21
Dissolver Logic	1365172	1365174	21	8-47



## NUMERICAL INDEX TO SCHEMATICS

Assy. No.	Schematic No.	Title	Fig. No.	Page
1363721	1363723	Store and Sequential Gating	1	8-5
1363724	1363726	Seven-Segment Decoder/Driver	2	8-7
1363727	1363729	Buffer Store and Buffered Functions	3	8-9
1363730	1363732	Keyboard Number Encoder	7	8-17
1363733	1363735	Scratch Pad Memory	8	8-19
1363736	1363738	Serial Decade Counter and Comparator	13	8-29
1363739	1363741	Up/Down Counter Mother Board	11	8-25
1363742	1363744	Decade <=> Comparator Mother Board	9	8-21



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**AMPEX**


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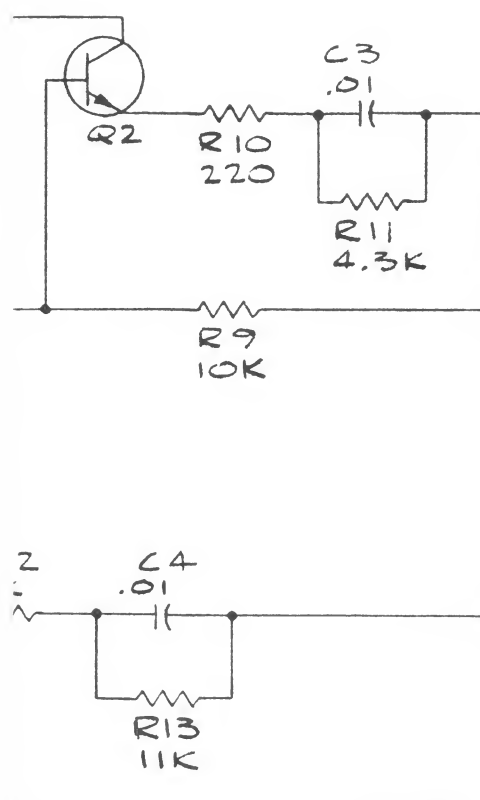
**ALPHABETICAL INDEX TO SCHEMATICS**

<i>Title</i>	<i>Schematic No.</i>	<i>Ref. Assy. No.</i>	<i>Fig. No.</i>	<i>Page</i>
Rewind (Supply) Motor Driver	1363798	1363796	5-2	5-7
Take-up Motor Driver	1363801	1363799	5-3	5-9
Tape Compliance and Adjust	1367241	1367240	5-1	5-5
VR-3000 Portable Video Recorder Wiring Diagram	1363819	-----	5-4	5-11

**NUMERICAL INDEX TO SCHEMATICS**  
 (By Reference Assembly Number)

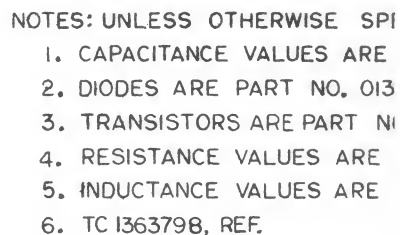
<i>Ref. Assy. No.</i>	<i>Schematic No.</i>	<i>Title</i>	<i>Fig. No.</i>	<i>Page</i>
1363796	1363798	Rewind (Supply) Motor Driver	5-2	5-7
1363799	1363801	Take-up Motor Driver	5-3	5-9
1367240	1367241	Tape Compliance and Adjust	5-1	5-5
-----	1363819	VR-3000 Portable Video Recorder Wiring Diagram	5-4	5-11

1PEX



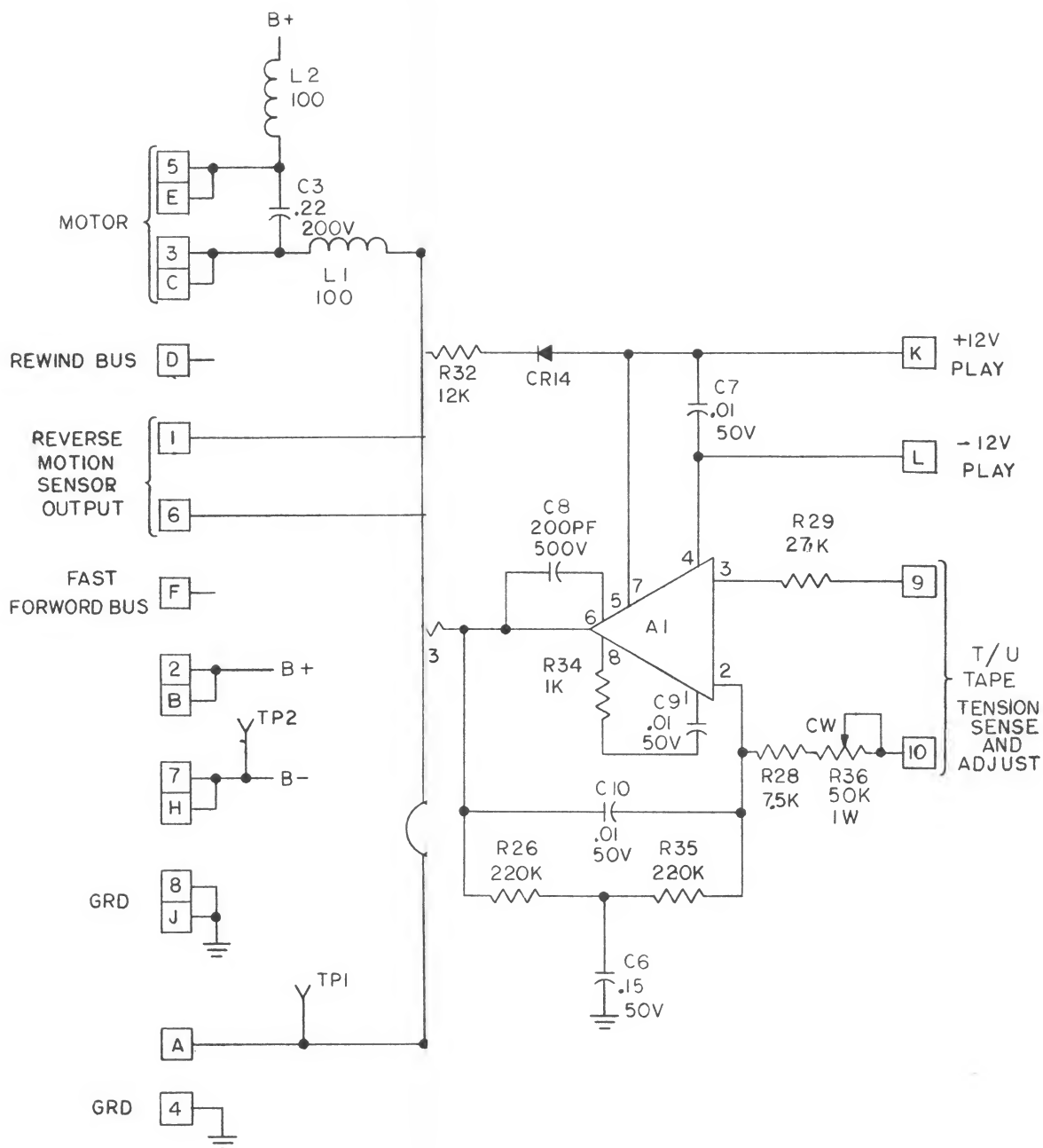
FIELD SUBSTITUTION		
REF. DES.	AMPEX P/N	COM'L. EQUIV.
C1-4	013-689	NONE
Q1-3	014-383	2N2484

Figure 5-1. Tape Compliance and Adjust Schematic



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IPEX



- NOTES: UNLESS OTHERWISE SPEC
1. CAPACITANCE VALUES ARE
  2. DIODES ARE PART NO. 0
  3. TRANSISTORS ARE PART 1
  4. RESISTANCE VALUES ARE
  5. INDUCTANCE VALUES ARE

Figure 5-3. Take-up Motor Driver Schematic

AMPEX

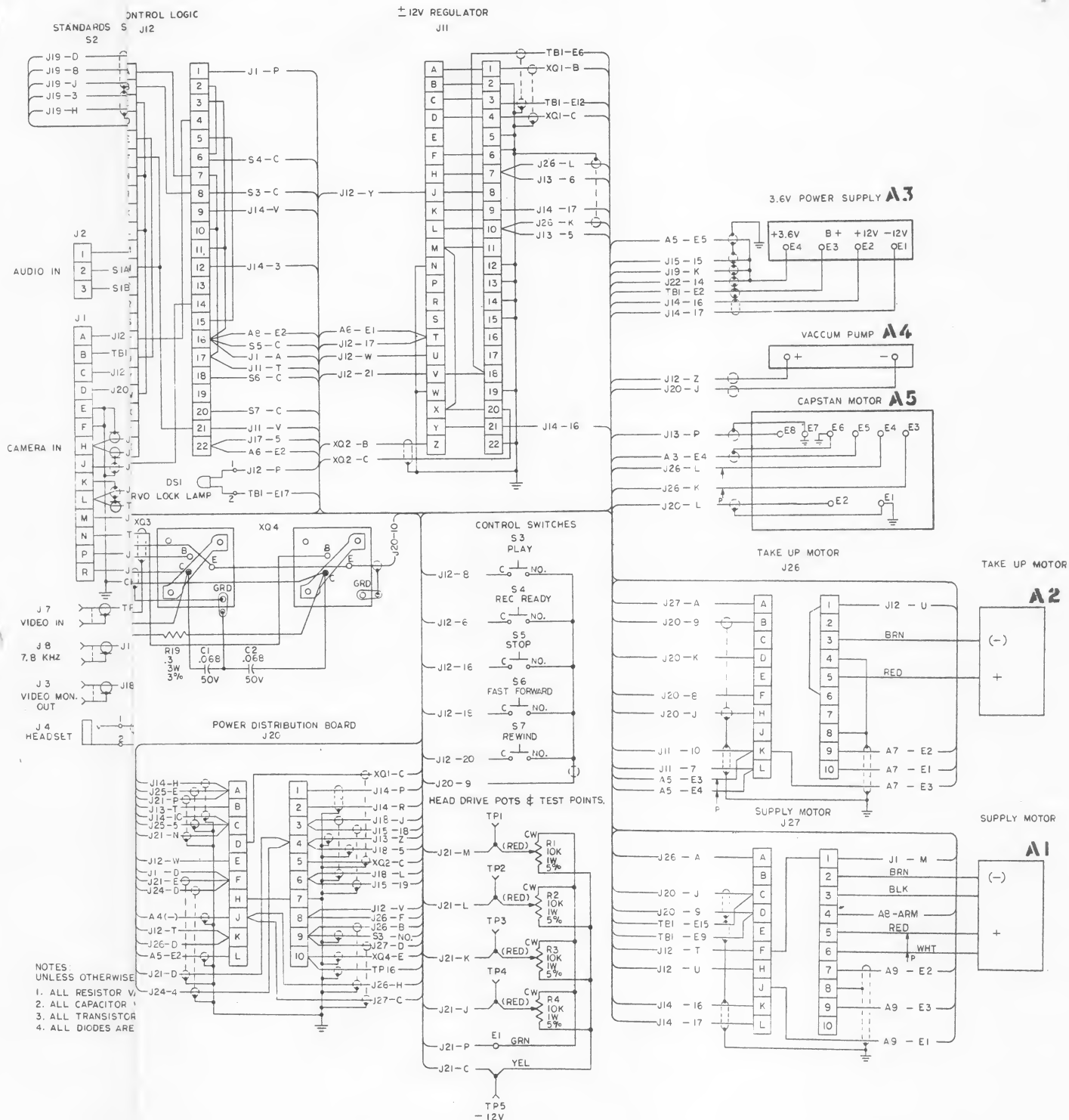


Figure 5-4. VR-3000 Portable Video Recorder Wiring Diagram

lic No. 1363819B

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**AMPEX**


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**SECTION VI****ASSEMBLY DRAWINGS AND LISTS OF MATERIALS**

This section contains assembly drawings and lists of materials pertaining to the equipment described in this manual.

This introduction describes the arrangement of the material in the section and its use. The section has a two-part index, one listing the assembly drawings in alphabetical order and one listing them in numerical order. Alphabetical listings are generally in direct-reading order (e.g., "High Gain Amplifier", not "Amplifier, High Gain").

Each item of a typical LM is explained below. The key number preceding each item corresponds to the same key number on the sample LM, shown on the page immediately following.

- 1 *Assembly Title.* This is the title assigned the assembly by the Ampex Engineering Department.
- 2 *Catalog Number of Assembly.* This number corresponds to the number stamped on, or affixed to, the assembly during manufacture.
- 3 *Item Number.* This number is assigned to parts to aid in identifying and locating the parts on the LM or assembly drawing.
- 4 *Ampex Part Number.* These are Ampex's document and part control numbers.
- 5 *Vendor or Military Number.* This is the identification number that Ampex used to purchase the part from a vendor. Any suitable equivalent may be used in the procurement of parts so identified.
- 6 *Schematic Reference.* This number is assigned to electrical components on the schematic drawings.
- 7 *Part Description.* This is an abbreviated explanation of each part used in the complete assembly, to assist the user in identifying parts. Where the same part is listed more than one time on an LM, the statement "Same As . . ." may be given, and refers to the description given for the first listing of the part.
- 8 *MFR Code (Manufacturer's Code).* This number is the Federal Supply code of the manufacturer of purchased items.
- 9 *Quantity Required Per Version.* This number indicates the quantity of each part required in the complete assembly.
- 10 *Sheet of .* This figure indicates the number of pages comprising the complete list of materials for the assembly.
- 11 *NHA (Next Higher Assembly).* If applicable, indicates which assembly this LM is subordinate to and upon which LM it may be found.
- 12 *Date.* This area of the page will contain the date that the LM page has been changed, since the manual was issued. Where no changes have been made, there will be no date given. (Exception: Audio manuals)
- 13 *Control Number.* Shows the drawing revision current at time of publication.
- 14 *Page Number.* This is the page number assigned to each page, as listed in the indexes. In the sample page number 6-177/178, the 6 signifies the sixth section of the manual, and the -177/178 indicates the 177th page of the section (178 indicating the back is blank).

An explanatory figure on the second page following illustrates how to find a part number or name by cross-referencing the item key numbers between the LM's and the assembly drawings and schematic diagrams.

ELECTRONIC EGG TIMER ASSEMBLY			CATALOG NO. 1984269			SHEET 1 OF 1		
						NHA 1776204		
ITEM NO.	AMPEX PART NO.	VENDOR OR MIL. NO.	SCHEMATIC REFERENCE	PART DESCRIPTION	MFR CODE	QUANTITY REQUIRED PER VERSION		
						-04	-05	
1	1985229-02			PRINTED WIRING ASSEMBLY		1	1	
2	212-345	2N5227	Q1, 2, 4	TRANSISTOR	24567	3	3	
3	150-142		Ref Q1, 2, 4	SOCKET, Transistor Mounting	29765	3	3	
4	210-967		R1-R16	RESISTOR, 50k, 1/2W, 5%		16	16	
5	210-957		R17	RESISTOR, 25k, 1/2W, 5%		1	-	
6	210-945		R17	RESISTOR, 15k, 1/2W, 5%		-	1	
7	114-789	1N6452	CR1-8	DIODE		8	8	
8	113-946	1N6784	VR1	DIODE, Zener, 4.6V, 5%	18665	1	-	
9	113-687	1N3582	VR1	DIDOE, Zener, 3.8V, 5%	18665	-	1	
10	1210987-05			PROBE, Egg Temperature, white egg		1	-	
11	1210987-06			PROBE, Egg Temperature, brown egg		-	1	
12	1921346-02			READOUT, Digital, egg temperature		1	1	
14	711-269	#381		LAMP, Miniature, 6V, T-1-3/4		2	2	
15			1066974	SCHEMATIC		REF	-	
16			1066993	SCHEMATIC		-	REF	
17	401-611	3N99	Q3	CHOPPER	56734	1	1	
18	1122334-60			PANEL, Housing		1	1	
19	509-391			SCREW, Self-tapping, #6 x 1/2"		12	12	
20	589-112			WASHER, Flat		12	12	
21	8763224-01			HARNFSC		1	-	
22	8763224-02					-	1	
23	6000000-09			Label, Identification		1	-	
24	6000000-10			LABEL, Identification		-	1	
25	1669222-01			HOLDER, Egg, size AA		1	1	
26	1669222-02			HOLDER, Egg, size A		1	1	
30	347-899			WATER		A/R	A/R	

Diagram illustrating an assembly drawing with numbered callouts (4, 7, 8, 14) pointing to various components of a mechanical system, likely a pump or motor assembly.

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## ALPHABETICAL INDEX TO ASSEMBLIES

<i>Title</i>	<i>Assembly No.</i>	<i>Page</i>
Compliance Arm Assembly	1367364	6-23
Compliance Arm Assembly LM	1367364	6-21
Modification Kit, Capacitive Tape Compliance Assembly (LM only)	1368161	6-7
Tape Compliance Assembly, Supply	1367360	6-11
Tape Compliance Assembly, Supply, LM	1367360	6-9
Tape Compliance Assembly, Take-up	1367361	6-15
Tape Compliance Assembly, Take-up, LM	1367361	6-13
Tape Compliance Sense and Adjust Printed Wiring Assembly	1367240	6-19
Tape Compliance Sense and Adjust Printed Wiring Assembly LM	1367240	6-17

## NUMERICAL INDEX TO ASSEMBLIES

<i>Assembly No.</i>	<i>Title</i>	<i>Page</i>
1367240	Tape Compliance Sense and Adjust Printed Wiring Assembly and LM	6-17
1367360	Tape Compliance Assembly, Supply, and LM	6-9
1367361	Tape Compliance Assembly, Takeup, and LM	6-13
1367364	Compliance Arm Assembly and LM	6-21
1368161	Modification Kit, Capacitive Tape Compliance Assembly (LM only)	6-7

CAPACITIVE TAPE COMPLIANCE ASSEMBLY MODIFICATION KIT						CATALOG NO. 1368161		SHEET 1 OF 1			
								NHA CATALOG			
ITEM NO.	AMPEX PART NO.	VENDOR OR MIL. NO.	SCHEMATIC REFERENCE	PART DESCRIPTION	MFR CODE	QUANTITY REQUIRED PER VERSION					
						-01					
1	1361680-02			COVER, Tape Compliance, Supply		1					
2	1361681-02			COVER, Tape Compliance, Take-up		1					
5	1367360-02			TAPE COMPLIANCE ASSEMBLY, Supply		1					
6	1367361-02			TAPE COMPLIANCE ASSEMBLY, Take-up		1					
9	1367241			SCHEMATIC, Tape Compliance Sense and Adjust	REF						
10	1363798			SCHEMATIC, Rewind Motor Driver	REF						
11	1363801			SCHEMATIC, Take-up Motor Driver	REF						
12	1363819			WIRING DIAGRAM, VR-3000	REF						
15	1809040			INSTRUCTION MANUAL		2					
18	041-411			RESISTOR, Composition, 47K ohm, 1/4W, 5%		1					
19	041-483			RESISTOR, Composition, 27K ohm, 1/4W, 5%		1					
22	059-352			RESISTOR, Variable, 50K ohm, 1W, 5%		2					

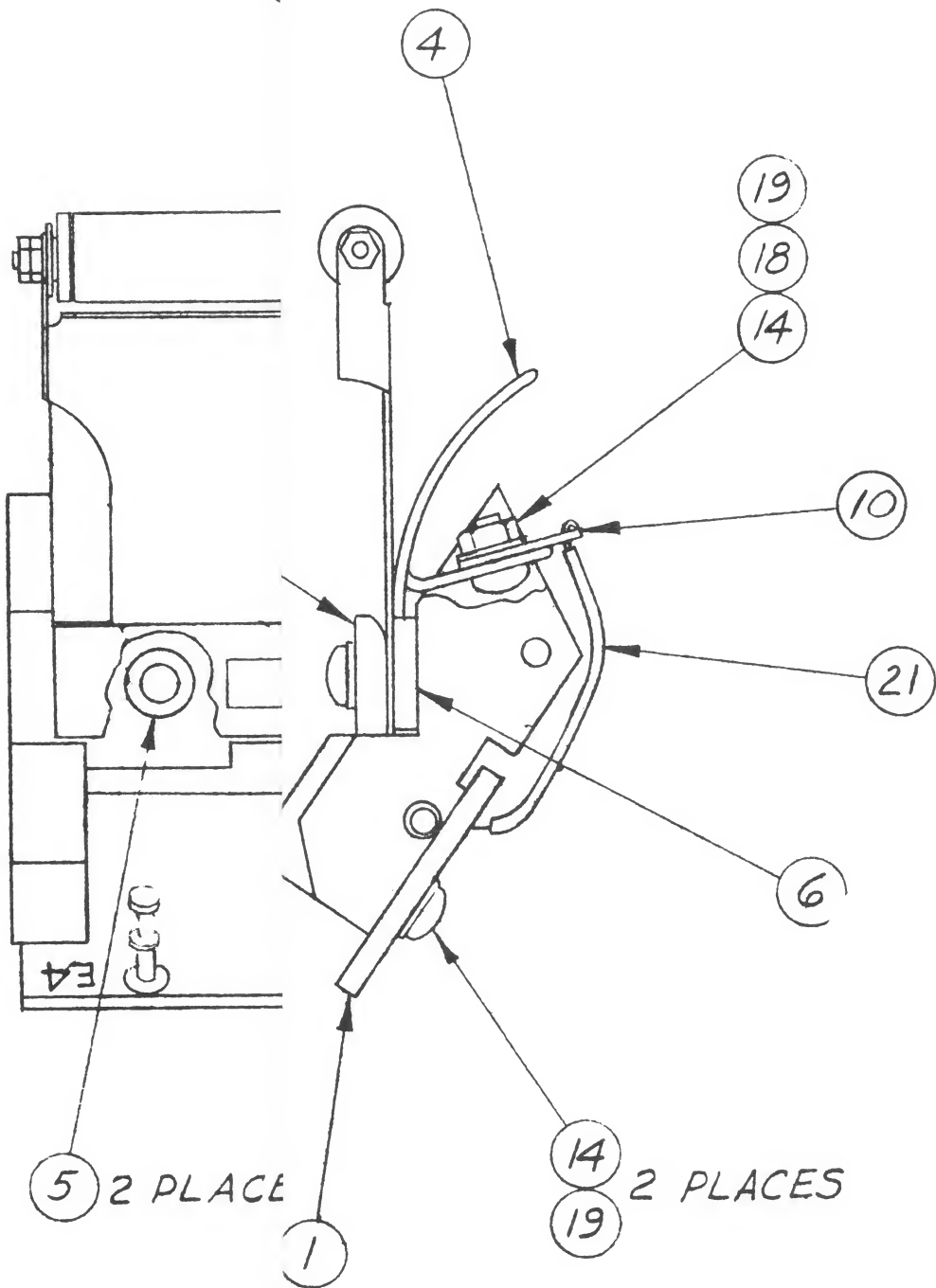
1368161 -

SUPPLY TAPE COMPLIANCE ASSEMBLY						CATALOG NO.1367360		SHEET 1 OF 1			
								NHA 1368161			
ITEM NO.	AMPEX PART NO.	VENDOR OR MIL. NO.	SCHEMATIC REFERENCE	PART DESCRIPTION	MFR CODE	QUANTITY REQUIRED PER VERSION					
						-02					
1	1367240-01			PRINTED WIRING ASSEMBLY, Tape Compliance Sense and Adjust		1					
2	1367362-01			POST, Compliance Arm, Supply		1					
4	1367371-01			PLATE, Capacitor, Supply		1					
5	1367369-01			WASHER, Insulating		2					
6	1367370-01			PLATE, Insulating		1					
7	1367373-01			PLATE, Spring Retaining		1					
8	1367364-02			COMPLIANCE ARM ASSEMBLY		1					
10	172-027			TERMINAL LUG, Solder, #2		1					
14	472-451			SCREW, Machine, Cross-recessed, Pan Head, 2-56 x 3/16 Long		3					
15	472-455			SCREW, Machine, Cross-recessed, Pan Head, 2-56 x 7/16 Long		2					
18	492-007			NUT, Plain, Hex, 2-56		1					
19	502-023			WASHER, Lock, Flat, Internal Tooth, #2		5					

1367360B

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IPEX



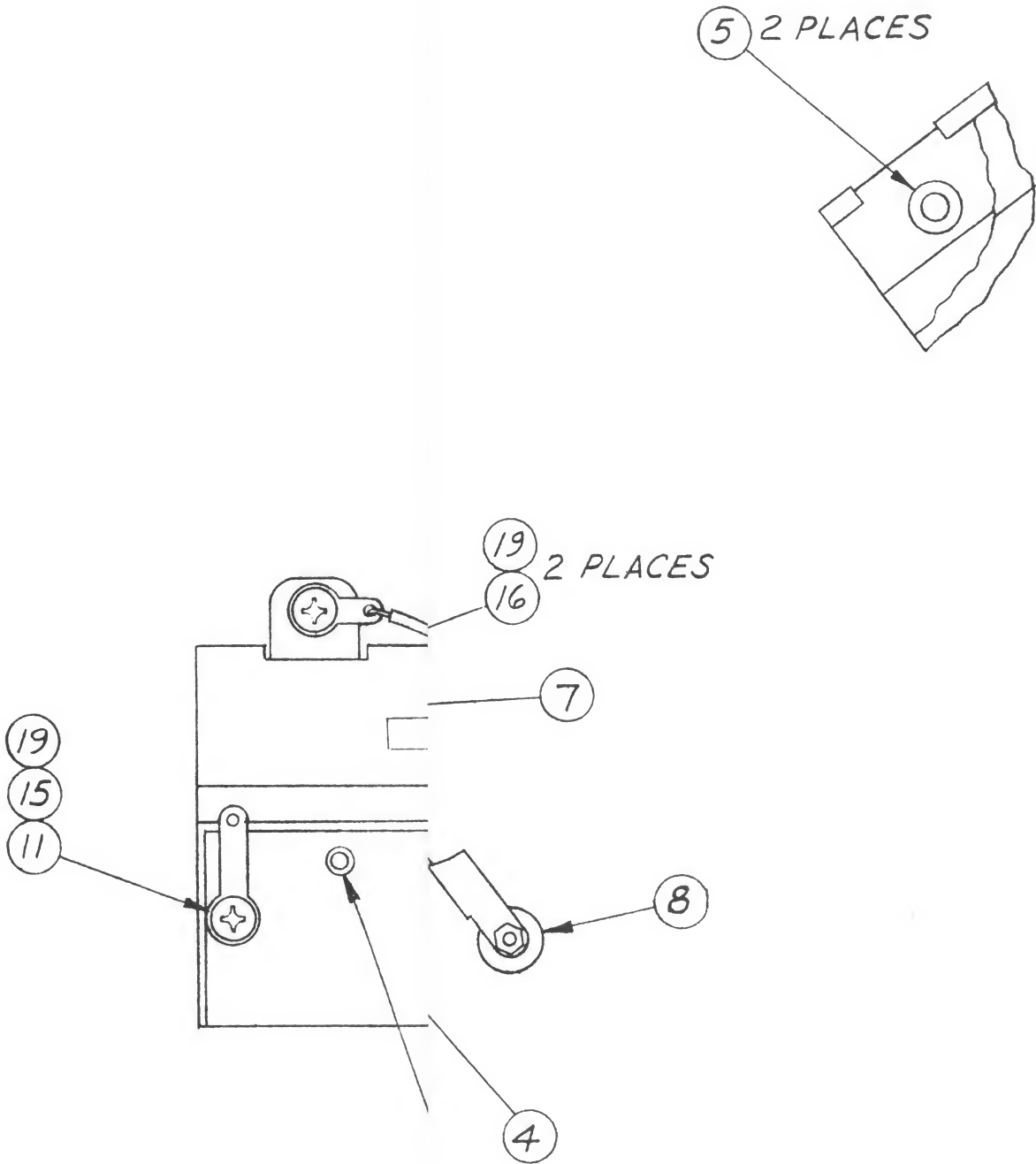
Tape Compliance Assembly, Supply  
Drawing No. 1367360B

TAKEUP TAPE COMPLIANCE ASSEMBLY					CATALOG NO.	1367361	SHEET 1 OF 1						
							NHA 1368161						
ITEM NO.	AMPEX PART NO.	VENDOR OR MIL. NO.	SCHEMATIC REFERENCE	PART DESCRIPTION	MFR CODE	QUANTITY REQUIRED PER VERSION							
						-02							
1	1367240-01			PRINTED WIRING ASSEMBLY, Tape Compliance Sense and Adjust		1							
2	1367363-01			POST, Compliance Arm, takeup		1							
4	1367372-01			PLATE, Capacitor, takeup		1							
5	1367369-01			WASHER, Insulating		2							
6	1367370-01			PLATE, Insulating		1							
7	1367373-01			PLATE, Spring Retaining		1							
8	1367364-02			COMPLIANCE ARM ASSEMBLY		1							
10	172-027			TERMINAL LUG, Solder, #2		1							
11	172-015			TERMINAL LUG, Solder, #2		1							
15	472-451			SCREW, Machine, cross-recessed, pan head, 2-56 x 3/16		3							
16	472-455			SCREW, Machine, cross-recessed, pan head, 2-56 x 7/16		2							
18	492-007			NUT, Plain, hex, 2-56		1							
19	502-023			WASHER, Lock, flat, internal tooth, #2		5							

1367361B

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IPEX



*Tape Compliance Assembly, Take-up*  
*Drawing No. 1367361B*

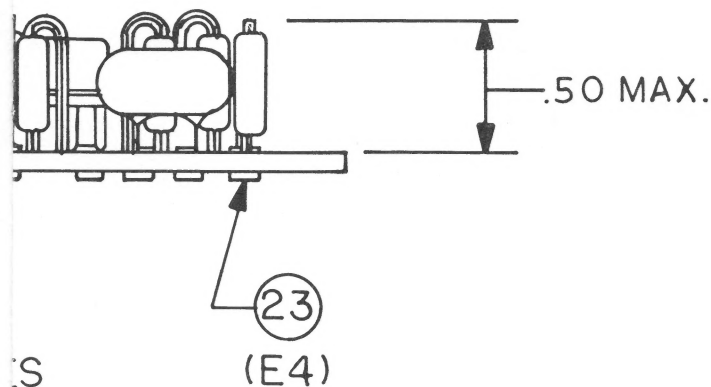
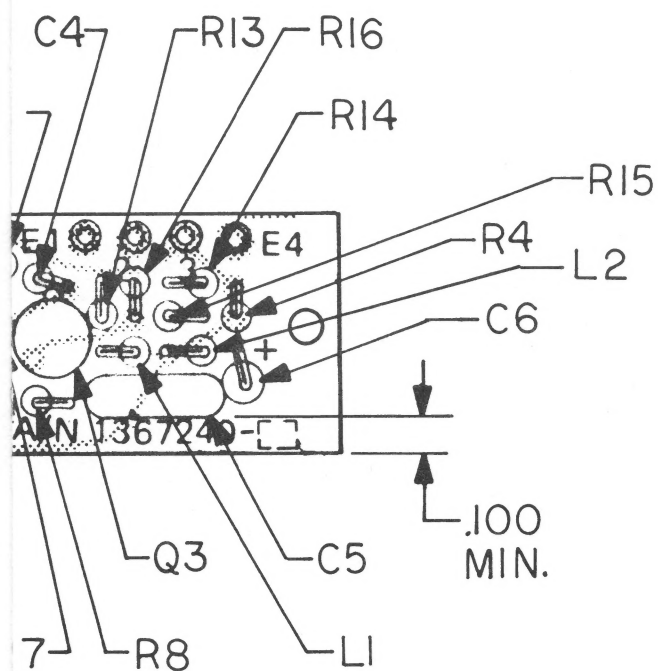
TAPE COMPLIANCE SENSE AND ADJUST PRINTED WIRING ASSEMBLY					CATALOG NO. 1367240	SHEET 1 OF 1						
					NHA 1367361, 1367360							
ITEM NO.	AMPEX PART NO.	VENDOR OR MIL. NO.	SCHEMATIC REFERENCE	PART DESCRIPTION	MFR CODE	QUANTITY REQUIRED PER VERSION						
						-01						
1	1367239-01			PRINTED WIRING BOARD (ONLY)		1						
2	1367241			SCHEMATIC		REF						
4	013-689		CR1-4	DIODE		4						
5	014-383		Q1-3	TRANSISTOR		3						
7	034-177		C5	CAPACITOR, Mica, 100PF, 500V, 5%		1						
8	037-367		C6	CAPACITOR, Tantalum, 2.2μF, 20V, ±10%		1						
10	041-394		R7,8	RESISTOR, Composition, 100K ohm, 1/4W, 5%		2						
11	041-396		R10	RESISTOR, Composition, 220 ohm, 1/4W, 5%		1						
12	041-407		R16	RESISTOR, Composition, 3.3K ohm, 1/4W, 5%		1						
13	041-408		R5,9	RESISTOR, Composition, 10K ohm, 1/4W, 5%		2						
14	041-410		R4,12	RESISTOR, Composition, 1000 ohm, 1/4W, 5%		2						
15	041-413		R2	RESISTOR, Composition, 6.8K ohm, 1/4W, 5%		1						
16	041-414		R6	RESISTOR, Composition, 2.2K ohm, 1/4W, 5%		1						
17	041-415		R3	RESISTOR, Composition, 68K ohm, 1/4W, 5%		1						
18	041-584		R11,15	RESISTOR, Composition, 4.3K ohm, 1/4W, 5%		2						
19	041-748		R13,14	RESISTOR, Composition, 11K ohm, 1/4W, 5%		2						
20	051-411		L1,2	INDUCTOR, 470μH, 10%		2						
21	058-328		R1	RESISTOR, Variable, 2K ohm, 1W		1						
25	280-130		Q1-3	PAD, Transistor Mounting		3						
26	064-005		C1-4	CAPACITOR, Ceramic, 0.01μF, 50V, +10%		4						

1367240-

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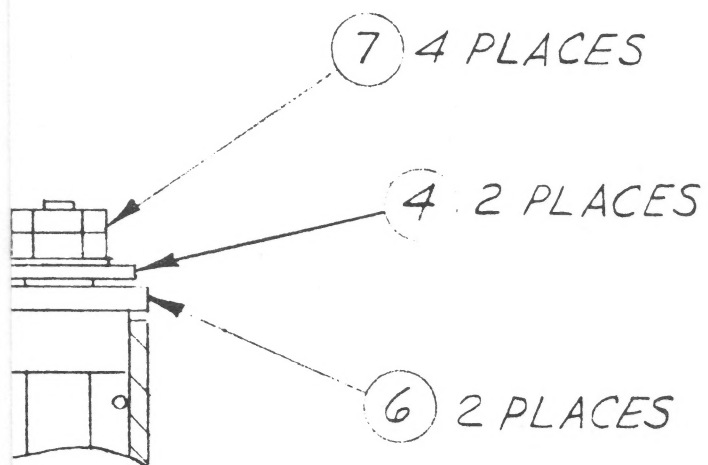
*Tape Compliance Sense and Adjust Printed Wiring  
Assembly  
Drawing No. 1367240—*

COMPLIANCE ARM ASSEMBLY					CATALOG NO. 1367364		SHEET 1 OF 1						
							NHA 1367361, 1367360						
ITEM NO.	AMPEX PART NO.	VENDOR OR MIL. NO.	SCHEMATIC REFERENCE	PART DESCRIPTION	MFR CODE	QUANTITY REQUIRED PER VERSION							
						-02							
2	1367366-01			IDLER		1							
3	1367367-01			SHAFT, Idler		1							
4	1367368-01			BEARING, Washer		2							
5	352-064			SPRING, Coil, compression, .180 O.D. x .75 long , free		1							
6	420-056			BEARING, Ball, flanged		2							
7	498-378			NUT, Plain, hex, 1 MM x .25 pitch, metric		4							
8	1367365-02			SPRING, Leaf		1							

1367364A

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IPEX



A/L A

Compliance Arm Assembly  
Drawing No. 1367364A

